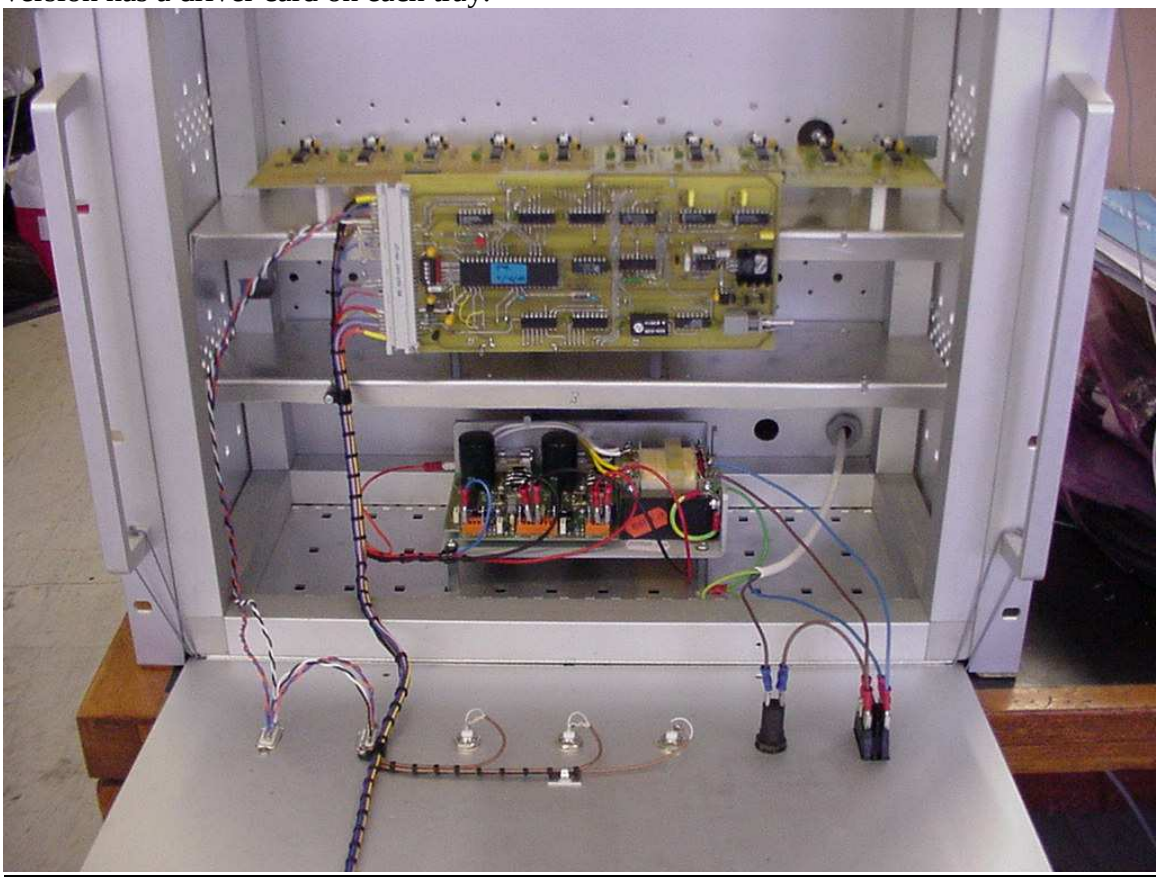
Pulser Kit

Comprising:
2 Control cards
4 LED driver cards
2 power supplies (set for 110v, use a 0.5A fuse)
2 cable harnesses
30 LED's
PCB mounting hardware
LED indicators, switches & sockets
1 reel fibre optic cable (dispatched separately)

Assembly
This picture of our prototype illustrates the general layout of the electronics. The final version has a driver card on each tray.

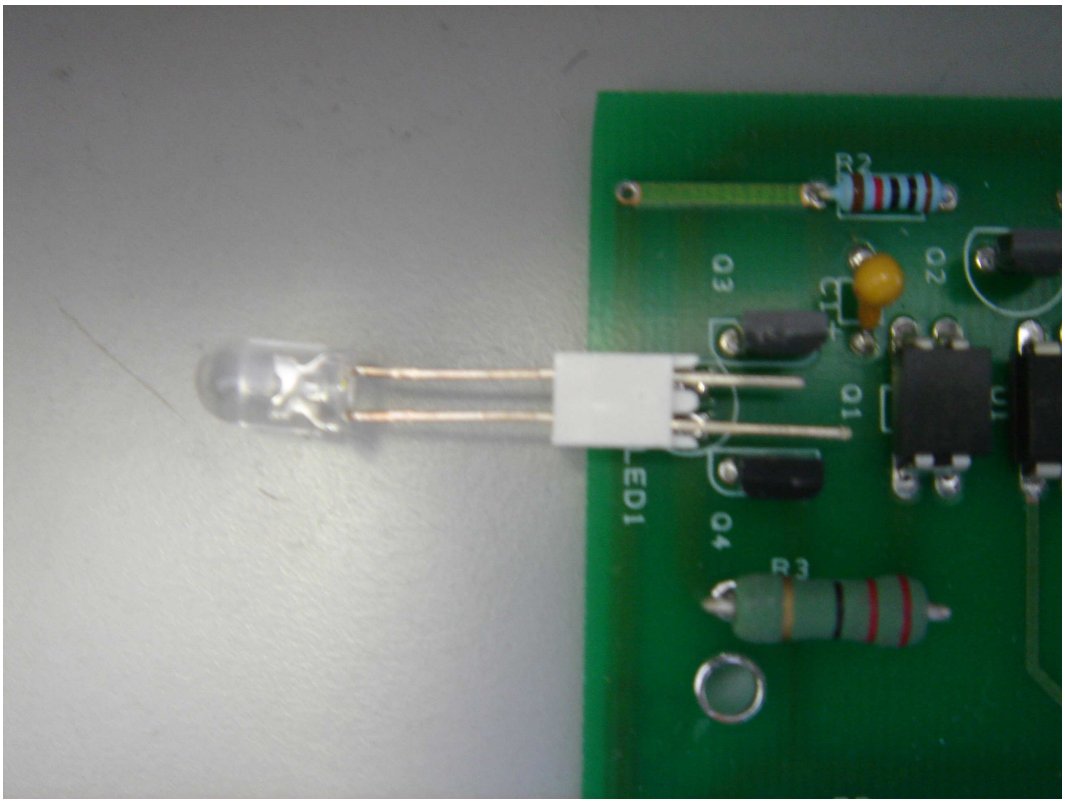


The Control card plugs into the connectors along the long edges of the driver cards. If required either slot can be used on its own. The LED sockets are numbered looking into the sockets from the front of the boards. [The only position with a cone in the photo is no.2]. Your boards are only populated for 6 LED's per board, giving the following pattern :

Upper board	1,2, 4, 6, 8, 10
Lower board	11,12,14,16,18,20

Fitting LED's

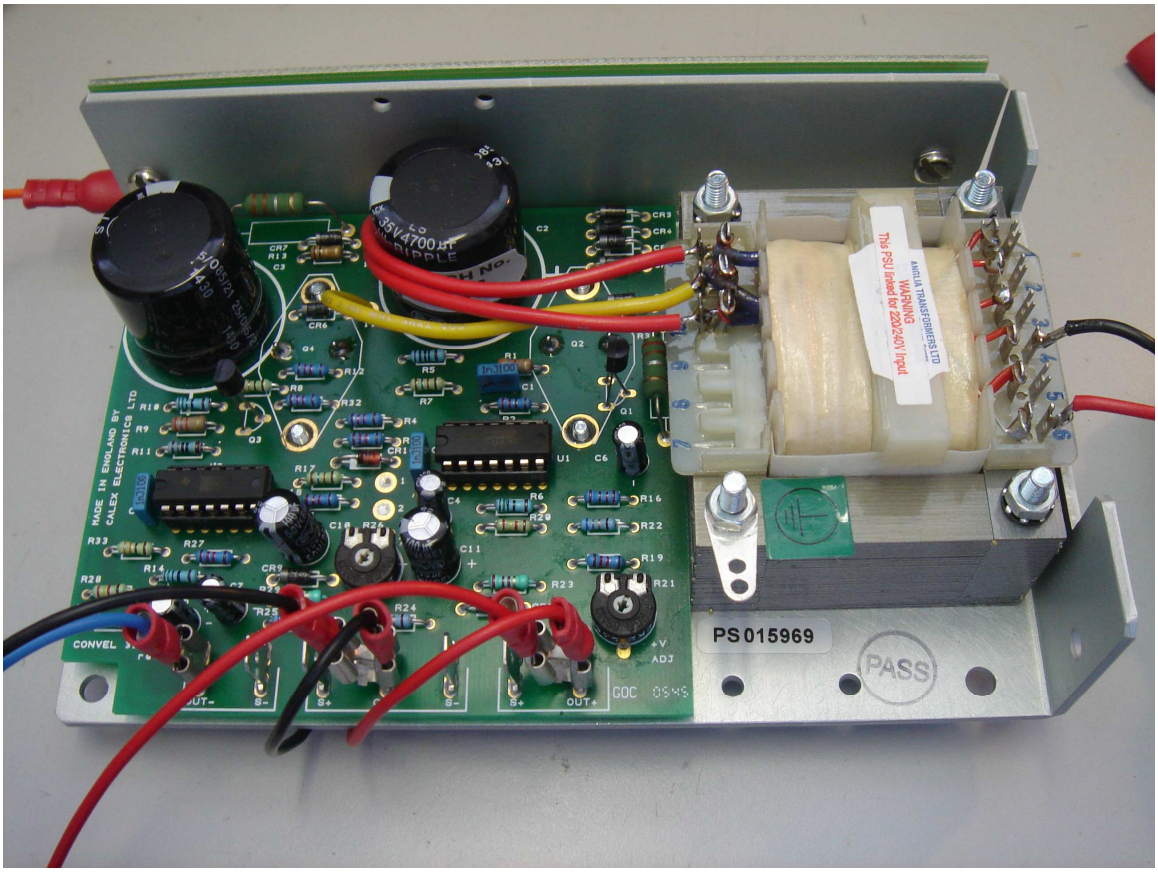
The driver board trays should be fitted with the mounting pillars (supplied), next fit the LED's to the cones. The driver board can then be slid into place, whilst inserting the leads into the two pin connectors. Finally attach the board to the pillars.



Looking into the sockets, LED's are inserted with the cathode lead (shortest) to the left. You can safely run with any number of LED's fitted.

Power Supply

Connect the power leads with ¼ inch push-on connectors, to the supply which has been preset to give a +/- 15v output.
Black to COM
Blue to OUT- (-15v)
Red to OUT+ (+15v)
Orange to +5v (Regulator board mounted on the rear of the power supply)



Make a 110/15v connection to the power supply transformer pins 4 and 6 via a 0.5A fuse. A ground connection can be made to the tag on the transformer.

Finally the 32 way connector on the harness goes to one end of the control card.
The only other required connection for initial tests is the serial lead. This can be directly connected to a PC or laptop comport.

Connections for Panel indicators etc. are given on the last page of this document.

Setup and Tests

Addressing & Trigger Delays

Each control card can have an individual address, this is set on the 6 way switch (on=0 and off=1), currently set to 1. Addresses are in binary where sw1=1, sw2=2, sw3=4 etc.

A 'trigger' light pulse is available at the fibre optic connector on the control card, and has a preset level and duration. The 12 way switch on the driver card sets the delay between the occurrence of any light pulse and the trigger pulse.

The switch operation is as follows: Switches 1 to 5 select 0-40mS in 10nS steps. Switches 6 to 11 select 0-250ns in 50nS steps. Only one switch in each group to be on at any one time. For zero delay switch 1 to on, switch 6 to on. Switch 12 is not used.

Communications Tests

The control card uses standard RS232 for communication with a PC or laptop.

Perhaps the easiest test environment would be to use Hyperterm (found in XP Programmes / Accessories / Communications) or a similar terminal emulator set to:

9600 bits per sec.
8 data bits
No parity
1 stop bit
No flow control

With the serial connector connected to COM1, commands can now be sent. With reference to the list of commands on the next page, an initial test can be performed. The important thing to note is that all commands must be preceded by the box number (ie. the pulser card address noted previously, which I will assume is set to 1 represented by ASCII 97)

To test communications, send the Startup command, starting with **a** (ASCII 97) followed by **A** (ASCII 65), a correctly working board will reply with **K** (ok). At this point you may wish to contact Phil for some software, which will probably be simpler than writing your own, if not I will go through the commands in more detail for you.

CODE	FUNCTION	PARAMETERS	REPLY
A	Startup	none	K
B	Pulse height top 2 bits	0-3	K
C	Pulse height low byte,	Nh,Nl.	K K [wait 2mS]
D	Pulse width	0-7	K
E	Select LED	1-20 **	K
F	Pulse multiplier,0-255.	Nh,Nl.	K K
G	No. of pulses, 0-255.	Nh,Nl.	K K
H	Period multiplier,0-255.	Nh,Nl	K K
I	pulse period, 0-255.	NH,Nl	K K
J	Start sequence		K
K	Start continuous		K
L	Read temperature		K
M	Send temperature high byte		000000vv
N	Send temperature low byte		vvvvvvvv
O	Load D/A with pulse height		K
P	Ext. triggered sequence		K
Q	Continuous Ext. triggering		K
_X	Stop sequence or continuous		K

* Nh=0-F, Nl=0-F

**ASCII for LEDs 1-7=97-103, 8-14=105-111, 15-20=113-118

All commands except stop must be preceded by the box number.
Box numbers 0-31 are represented by decimal ASCII codes 96-127.

Cable Harness

1. +5v *Orange*
2.
3. Green LED cathode (Pulsing indicator) *Violet*
4. Yellow LED cathode (Ready indicator) *Pink*
5. Green LED anode (Pulsing indicator) *Blue*
6. Yellow LED anode (Ready indicator) *Yellow*
7. +15v *Red*
8.
9.
10.
11. Reset switch pin1 (Normally open) *Green*
12.
13. Inhibit BNC socket centre pin (Normally open) *Screened Cable (screen to 0v)*
14. 0v. Reset switch pin2 (Normally open) *Black*
15. 0v. Serial port, pin 5 *Green*
16. 0v
17. 0v
18. 0v.Red LED cathode (Power indicator) *Black*
19. 0v
20.
21.
22. –15v *Blue*
23. Red LED anode (Power indicator) *Red*
24.
25. Monitor BNC socket. *Screened Cable(screen to 0v)*
26. External trigger BNC socket. *Screened Cable (screen to 0v)*
27. Serial port, pin 2 *White*
28. Serial port, pin 3 *Black*
29.
30.
31.
32. Ov. *Black*

Front Panel

Power LED. Anode *Red*, Cathode *Black*
Ready LED.Anode *Yellow*, Cathode *Pink*
Pulsing LED. Anode *Blue*, Cathode *Violet*

BNC sockets: Monitor (TTL pulse output)
External Trigger (TTL signal)
Inhibit (TTL low ,or a short to ground inhibits pulsing)
Serial connector. (9way D) pin 2 *White*, pin 3 *Black*, pin 5 *Green*
Reset Push switch, normally open. pin1 *Green*, pin2 *Black*